REMARKS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1-24 are pending in the present application. The claims are maintained by the present response.

In the outstanding Office Action, Claims 1-3 and 11 were rejected under 35 U.S.C. § 103(a) as unpatentable over Rosencher et al. (U.S. Patent No. 5,086,327, herein "Rosencher") in view of Katoh (U.S. Patent No. 5,041,882); Claims 13, 14, 15, 18, 23, and 24 were rejected as unpatentable over Rosencher in view of Katoh; and Claims 6 and 12 were rejected under 35 U.S.C. § 103(a) as unpatentable over Rosencher, Katoh, and Nanbu (Japanese Patent No. 61054673 A).

Applicants thank the Examiner for the courtesy of a telephonic interview extended to Applicants' representative on March 24, 2004. During the interview the differences between the pending claims and the applied art were discussed. More specifically, a metastable level of an electron storage layer and a component of a transfer barrier layer having a concentration that varies linearly were discussed. In addition, the motivation for combining the applied art to support a rejection under 35 U.S.C. § 103(a) has been discussed. No agreement was reached, but the Examiner indicated that he will reconsider this application in view of a filed response. Arguments presented during the interview are reiterated below.

Claims 1-3 and 11 were rejected under 35 U.S.C. § 103(a) as unpatentable over Rosencher and Katoh. That rejection is respectfully traversed.

Initially, Applicants respectfully submit that the outstanding Office Action has not established a proper basis for the rejection.

As stated in MPEP §2142:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.

The outstanding rejection, particularly with respect to the claim limitation directed to the component of a transfer barrier layer having a concentration that varies linearly does not meet any of the three basic criteria noted above. First, no suggestion or motivation has been noted in Rosencher and Katoh to meet the claim limitations. The outstanding Office Action merely states that "it would have been obvious" for one of ordinary skill in the art to combine the two references, but provides no motivation or suggestion for supporting that statement. Moreover, the device in Rosencher is directed to electromagnetic wave detectors that use quantum physics effects (see column 1, lines 7-9), while the device in Katoh is directed to a heterojunction bipolar transistor that does not involve any quantum physics effects (see Abstract). Secondly, there is no expectation provided in either of the reference that such a modification as proposed by the outstanding Office Action would lead to any benefits of the wave detector in Rosencher.

MPEP §2143.01 goes on to note that a statement that a modification of the prior art to meet the claimed invention would have been well within the ordinary skill of the art at the time the claimed invention was made ... is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings (modify the teachings) of the references. That is clearly not the case in the outstanding rejection.

As discussed in the previously filed amendment and during the interview, independent Claim 1 is directed to an electromagnetic wave detector that includes, in part, an electron

storage layer having a metastable level and a transfer barrier layer that includes a component having a concentration that varies linearly, decreasing in a direction from a quantum well to the electron storage layer. In a non-limiting example, Figure 2 shows the quantum well layer 3, the transfer barrier layer 4, and the electron storage layer 5.

Turning to the applied art, the outstanding Office Action recognizes at page 3, lines 9-11, that Rosencher "does not teach wherein the transfer barrier layer includes a component having a concentration that varies linearly, decreasing in a direction from the quantum well to the electron storage well."

The outstanding Office Action relies on Katoh for teaching the above-noted feature not taught in Rosencher. The outstanding Office Action further indicates at page 3, lines 11-14, that Katoh teaches in Figure 4 and at column 3, line 20, to column 4, line 6, that a base layer of a transistor includes a component P that has a concentration that varies linearly.

However, as discussed during the interview, Applicants note that Katoh discloses at column 3, last paragraph, that a parameter β "is defined as the $Ga_{0.47(1-\beta)}In_{0.53+0.47\beta}As_{1-\beta}P_{\beta}$," and shows in Figure 4, the upper part of the drawing, three different conduction band profiles for three different values of the β parameter. More specifically, Katoh shows in Figure 4 that for a ***constant value*** of β, which is 1, 0.5, or 0, the conduction band profile has a specific shape, decreasing from one side to an opposite side. However, by fixing the parameter β to a constant value, for example β=1, the concentrations of P and As in the base of a transistor (transfer barrier) are ***constant*** because the concentrations of P and As are given by β and 1-β, respectively (see the formula above). In other words, the profiles shown by Katoh in Figure 4 (upper part of the drawing) do not correspond to concentrations of P and As as asserted in the outstanding Office Action, but correspond to a shape of a conduction band, which is different from a concentration of P or As.

Thus, it is respectfully submitted that a concentration of either P or As in Katoh has a constant value for a given parameter β. Accordingly, the combination of Katoh and Rosencher does not teach or suggest a transfer barrier layer that includes a component having a concentration that varies linearly, decreasing in a direction from a quantum well to an electron storage layer.

In addition, the layer in Katoh that is asserted in the outstanding Office Action as having a component with a concentration that varies linearly is a base layer of a transistor, which does not have an equivalent function as the transfer barrier layer in Rosencher.

During the interview Examiner Brock indicated that Katoh states at column 3, line 66, to column 4, line 6, that "composition grading is also applied to the base layer." However, the composition grading disclosed in Katoh involves changing the chemical structure of the base layer completely, as disclosed at column 3, lines 65-66, i.e., from $Ga_{0.47}In_{0.53}$ at one end of the base layer, where the parameter β is 0, to InP at the other end of the base layer, where the parameter β is 1. In view of this radical "composition grading" in Katoh, Applicants respectfully submit that it is not clear how one of ordinary skill in the art would modify the barrier layer 4 in Rosencher to achieve the "composition grading" of Katoh as Rosencher specifically discloses at column 4, line 53, a uniform chemical composition of the barrier layer 4.

Further, the outstanding Office Action states at page 3, lines 4-7, that a metastable level "describes an intended use property or a method of using property of the electronic storage layer." Applicants respectfully submit that a metastable level is a physical property of a specific material and not an intended use property or a method of using the property as asserted in the outstanding Office Action. Further, Applicants respectfully submit that not all

materials have a metastable level, but only certain materials have that property. Rosencher and Katoh are silent whether the materials used in their devices have a metastable level.

Accordingly, it is respectfully submitted that independent Claim 1 and each of the claims depending therefrom patentably distinguish over Rosencher and Katoh.

Claims 13, 14, 15, 18, 23, and 24 were rejected under 35 U.S.C. § 103(a) as unpatentable over Rosencher in view of Katoh. That rejection is respectfully traversed.

Independent Claim 13 was amended in the previously filed amendment similar to independent Claim 1, discussed above. Therefore, the arguments presented above also apply to the rejection of independent Claim 13 under Rosencher and Katoh. Accordingly, it is respectfully submitted, for the same reasons as above, that independent Claim 13 and each of the claims dependent therefrom patentably distinguish over Rosencher and Katoh.

Claims 6 and 12 were rejected under 35 U.S.C. § 103(a) as unpatentable over Rosencher, Katoh, and Nambu. That rejection is respectfully traversed.

The outstanding Office Action relies on Nanbu for teaching first and second ohmic contacts. However, Nanbu does not overcome the deficiencies of Rosencher and Katoh discussed above. In addition, Claims 6 and 12 depend on independent Claim 1, which is believed to be allowable as noted above. Accordingly, it is respectfully submitted that Claims 6 and 12 are also allowable.

Consequently, in light of the above discussion, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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